

Institution: University of Sheffield
Unit of Assessment: A-04 Psychology, Psychiatry and Neuroscience
1. Unit context and structure, research and impact strategy

The Department of Psychology (36 academics, 14 research staff and 123 research students) has enhanced its research leadership, guided by the **two-strand strategy set out in REF2014**. First, we continued to **develop capacity within research groups whilst enhancing interdisciplinary collaboration** because we recognise that many challenges require input from multiple disciplinary perspectives. To this end we **refocused our groups around refreshed themes**: (1) Neuroscience and Cognition, (2) Interventions for Psychological Health, (3) Learning and Development Across the Lifespan, and (4) Social and Behavioural Change, with many researchers contributing to multiple themes. These priorities guided 16 new hires, building on our established strengths, with several strategic appointments stimulating thematic collaboration. For example, Bentall's appointment linked researchers across three themes by incorporating developmental and social approaches into our mental health research. We have positioned ourselves to lead national and international interdisciplinary collaborative initiatives in diverse fields including crisis response, personalised medicine, sustainability, and robotics. **Future strategy will continue to promote interdisciplinary research**; we are capitalising on the University's recent strategic investment in interdisciplinary flagship institutes (see *REF5a*) that focus collaboration between existing institutional strengths in neuroscience and healthy ageing.

Thematic re-alignment has supported the second strand of our **strategy**: to **realise the societal relevance of our research whilst maintaining the quality of fundamental science**. Our commitment to excellent fundamental science has placed us at the forefront of national and international efforts to promote and adopt open science practices. Our agile responsiveness to shifting societal priorities is evidenced by our rapid response to the COVID-19 pandemic: researchers from three themes lead an ESRC-funded multi-institution mixed-methods project that began data collection on the day that the first UK lockdown started, and produced governmental reports within weeks. Other examples of societal relevance include work addressing plastic re-use and recycling, neurovascular coupling in degenerative diseases, and social inequalities in cognitive and language development. We are responding to funder priorities by extending our focus on societal relevance to the needs of low- and middle-income countries (LMICs). Translation from societal relevance to public benefit is facilitated by working closely with diverse stakeholders throughout the research process. We plan to continue to address societal issues including cognitive decline in older adulthood and reducing alcohol-related harm, whilst maintaining our capacity to respond to emerging challenges and to capitalise on developing opportunities such as the growing availability of "big data" resources.

The effectiveness of our strategy is evidenced by publication of >1,100 papers (>166 papers per year, 43% higher than REF2014), that have received >13,000 citations (mean=11.75, Web of Science, 2020) and the award of 113 PhDs (16 per year). These outcomes have been supported by total research income of £10.2M including fellowships funded by the British Academy, EPSRC, ESRC, Royal Society and Wellcome. Our staff have received prestigious external recognition from the British Psychological Society (BPS), British Academy, and the International Society for Psychotherapy Research. Our research has had demonstrable real-world impact across all research themes, with particularly important influences on clinical practice including the treatment of eating disorders and outcome assessment in routine therapy. We have planned for the future by

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focussing appointments on internationally recognised early career researchers (ECRs) with demonstrable leadership potential. Sustainability is demonstrated by a number of recent grant successes including seven major ESRC awards in 2019 and 2020 (total £2.22M).

1.1 Research themes

The **Neuroscience and Cognition theme** (eight staff, including one professor and one ECR) represents a refocusing of our systems and computational neuroscience groups. Following senior retirements, we maintained thematic strength by appointing Schmidt who bolsters links between computational and systems researchers addressing action control, and Saal who strengthens sensory computational modelling capacity. Embodying our **approach to interdisciplinary collaboration**, we directed the Sheffield Robotics research centre (>100 researchers from science, engineering, public health, social sciences, and the arts) from inception (2011) until 2017 with Wilson continuing to represent us on the leadership executive. As planned in 2014, Sheffield Robotics opened new laboratory space (750m²) in 2015 from a £3M University investment. This supports access to state-of-the-art resources such as the iCub humanoid robot that enables our computational neuroscientists to model human brain functioning on neurobotic platforms, with novel artificial intelligence applications (e.g., *Philosophical Transactions of the Royal Society B: Biological Sciences*). Wet lab neuroscience capacity has been increased by **adding *in vivo* two photon microscopy imaging (targeted in REF2014)**. In combination with existing technologies (see Section 3), we can now conduct preclinical studies spanning single cell to whole brain neuroimaging.

Fundamental advances include computational models of tactile sensation (*Science Translational Medicine, Current Biology, PNAS, eLife*), neurovascular coupling (*J Neuroscience, Cerebral Cortex*), and the role of dopamine in action control (*Neuron, Nature Neuroscience, PLOS Biology*). **Applications to societal challenges** include cell transplantation and gene therapy methods to treat retinal degeneration (*PNAS, Molecular Therapy*), and delineating the role of neurovascular coupling in epilepsy (*Neuroimage, Epilepsia*), Alzheimer's (*J Cerebral Blood Flow and Metabolism, J Alzheimer's Disease*), and Parkinson's diseases (*eLife, Nature Scientific Reports*). We also developed natural tactile sensations for neuroprosthetic devices (*Neuropsychologia*) and improved responses to rare traffic events in autonomous vehicles (*IEEE Transactions*).

Looking forward, participation in University-funded multidisciplinary research groupings, such as continued involvement in Sheffield Robotics, will stimulate **interdisciplinary collaborations** addressing fundamental and applied research questions. To this end we shaped the flagship Neuroscience Institute (launched 2019), which focuses the expertise of over 100 translational, sensory, developmental and systems neuroscience researchers from across the engineering, science and medical faculties to advance prevention and treatment of neurological, sensory and developmental disorders. Berwick and Martin were instrumental in its inception and both are board members; Martin leads imaging technology. Sensory neuroscience is one of three pillars of the institute, therefore our participation **achieves our REF2014 ambition to develop a multidisciplinary sensory neuroscience centre**. The Neuroscience Institute will support our future goals including identifying neurovascular biomarkers of early neurodegeneration and developing novel therapeutics for Alzheimer's disease.

The **Social and Behaviour Change theme** (10 staff, including three professors and two ECRs) develops our long-standing strengths in theoretical models of behaviour change and their application to societal challenges. **Fundamental research** has identified the importance of monitoring for goal attainment (*Psychological Bulletin*), the influence of self-compassion on health behaviours (*Health Psychology*) and demonstrated that mere measurement of intentions influences

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behaviour (*Personality and Social Psychology Review*). With more immediate **societal relevance**, substantial work focusses on specific health behaviours, such as the determinants and modification of food and alcohol intake (e.g., *Health Psychology Review, J Consulting and Clinical Psychology*). Appointments of Buckland, Field, Sirois and Webster have refreshed our health psychology capacity, and Iyer provides new links to political science. **Interdisciplinary capacity** was strengthened with the appointment of Debowska, whose expertise in criminology and involvement in GCRF-funded research on interventions to reduce intimate partner violence in the Caribbean (*Computers in Human Behaviour*) has expanded the global societal relevance of work in this theme. Our **interdisciplinary commitment** supports application of health psychology approaches to clinical issues including psychosis (*Clinical Psychology Review*) and suicidal ideation (*Brit J Psychiatry*). Going forward, Buckland's work on weight management (e.g., *J Nutrition*) will link with our clinical expertise in eating disorders. Future plans, supported by three recent ESRC awards, are to continue fundamental research with societal relevance, including: a big-data approach to linkages between wide-ranging health behaviours; self-compassion and behaviour change; and the influence of political humour on attitudes and behaviour.

Interdisciplinary research within this theme is supported by our involvement in University initiatives including the cross-faculty Grantham Centre for Sustainable Futures (see *REF5a*), which unites academia, business, and policy. We contributed to two recent ~£1M UKRI projects (leading on one) to re-think plastic use, in collaboration with polymer chemists, linguists, geographers and engineers. Other members have taken leading roles in interdisciplinary applied projects. For example, Field conducts research to reduce alcohol-related harm in collaboration with researchers in the School of Health and Related Research, including digital interventions (funded by Alcohol Change UK and NIHR), and serving size "nudges" (*Addiction*). Norman works with clinical neurologists on an NIHR Programme grant developing interventions to support high calorie diets for motor neurone disease. Future interdisciplinary opportunities will be provided by the flagship Healthy Lifespan Institute (launched 2019, Webb leads the Behaviour Change theme) that combines expertise from >130 researchers from disciplines including social policy, cardiovascular biology and epidemiology to tackle multimorbidity in ageing.

The **Learning and Development Across the Lifespan theme** (10 staff, including two professors and two ECRs) expands the focus of our longstanding developmental psychology group. The Sheffield Autism Research Lab led by Milne and Freeth continues to provide an **interdisciplinary hub** addressing neurodevelopmental disorders from **fundamental** and **applied** perspectives. This is supported by our human cognitive neuroscience facilities that have been refreshed with new EEG and eye-tracking systems housed in space accessible to neurodivergent populations. Collaborators include neuroscientists to parse the heterogeneity in neural functioning in autism (*J Abnormal Psychology*), mathematicians to model eye-tracking in social situations (*J Abnormal Psychology*), geneticists to study rare genetic conditions, such as Sotos and Silver-Russel syndromes (*J Neuropsychology; J Abnormal Psychology*) and clinicians to understanding the lived experience of neurodevelopmental conditions (*Psychological Medicine*).

Another important focus in this theme is inequalities in social and cognitive development which has prompted both **fundamental** research to characterise social gradients (*Brit J Psychiatry, Clinical Psychology Review*) and **applied** work to test interventions to reduce inequalities in language (*J Child Psychology and Psychiatry*) and executive function (*Child Development*) development. Ongoing work is developing interventions to prevent communicative delays in hearing-impaired infants. Future plans include intervention development to reduce educational inequalities, supported by an ESRC New Investigator award to new appointee Blakey. We will also address global inequalities, as exemplified by Matthews' recent GCRF award to promote language development in Kenya and Zambia.

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The **REF2014 aim to extend neurocognitive work to real-world skill learning has been achieved**, with an expanded focus to incorporate adult development. This has involved **fundamental** work modelling the neural underpinnings of skilled cognition using EEG (*Neuroimage*) and identifying trajectories of skill development in longitudinal datasets regarding computer gaming (*Psychological Science*) and learning to drive (*Accident Analysis and Prevention*). Vaci's appointment brings methodological expertise and innovation in Bayesian modelling (*Behavior Research Methods*), applications of which include disentangling contributions from intelligence, practice and ageing (*PNAS; Psychology & Ageing*) and develops our capacity for data science. Recent work with **societal relevance** models trajectories of cognitive decline to identify early risk factors for dementia, and evaluate treatments (*Brit J Psychiatry*). New appointee Von Bastian, supported by recent ESRC and Mercator Fellowship funding strengthens capacity to rigorously evaluate interventions to develop and protect cognitive abilities through older adulthood, such as bilingualism (*JEP General*) and working memory training (*Intelligence; JEP General*).

The **Interventions for Psychological Health theme** (eight staff, including four professors) continues Sheffield's research leadership in **applied** clinical psychology. Work aims to understand and improve the effectiveness of routinely delivered psychological therapies, capitalising on the clinical and service delivery perspectives offered by researcher-practitioner roles. For example, recent work showed that counselling is as effective as CBT in treating depression (*BMC Psychiatry*) and ongoing NIHR-funded work develops telephone-delivered therapy. New appointees Bentall and Huddy have expanded expertise to include psychosis addressing its **fundamental** nature (*Schizophrenia Bulletin*) and evaluating treatment approaches (*Lancet Psychiatry*). Future NIHR supported work will utilise neuroimaging to identify trauma-related mechanisms underpinning effective treatment of psychosis.

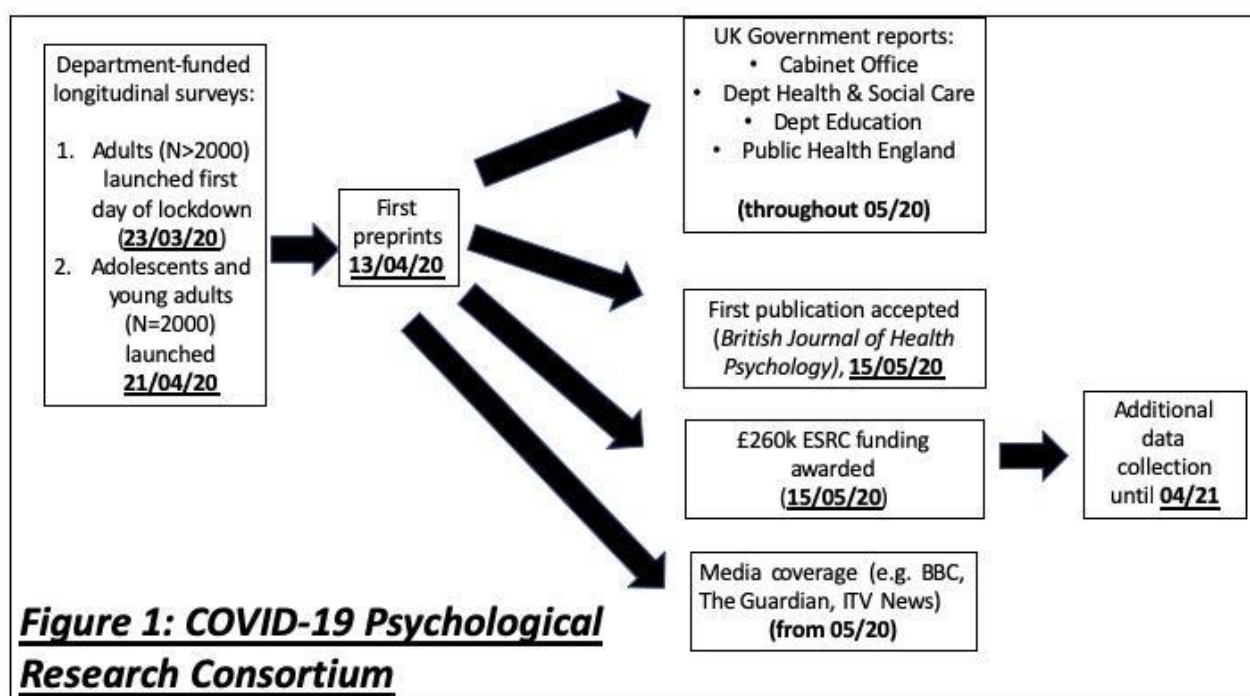
This theme promotes **interdisciplinarity**, focussing the skills of psychologists, health service researchers and statisticians. The longstanding Centre for Psychological Services Research recently became the Psychotherapy Evaluation and Research Lab at Sheffield (PEARLS) led by Delgadillo (appointed as successor to Barkham); Delgadillo summarised PEARLS's developing pathway towards precision mental health care (*JAMA Psychiatry*). This runs through fundamental prognostic epidemiology using big data, such as the national Increasing Access to Psychological Therapies (IAPT) evaluation datasets; identification of risks for poor outcomes in therapies for anxiety and depression (*Brit J Psychiatry*); developing decision tools to profile individual differences in treatment response (*Behavior Research and Therapy, J Consulting and Clinical Psychology*: this was one of the top 10 most downloaded articles across all APA journals in 2020); and field testing data-driven approaches to therapy modifications (*Lancet Psychiatry*) and e-triage (*Psychotherapy & Psychosomatics*). Future work will continue to develop approaches to service evaluation and improvement, including personalised medicine, while maintaining capacity to respond to developing mental health priorities including those related to COVID-19.

Research addressing psychological service delivery has natural **societal relevance**. Our work addressing routine assessment of therapeutic outcomes, the treatment of eating disorders and psychological issues in managing skin conditions has been tailored for real-world benefit through our impact strategy (described below) and forms our case studies. We continue to develop these topics with an international emphasis. For example, Barkham's Clinical Outcomes in Routine Evaluation measure is used extensively in Europe and increasingly globally, including in China and South America. We have begun evaluating eating disorder therapies across Europe, North and South America, Asia and Australia.

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Responsiveness to emerging priorities

Our **strategy to promote interdisciplinary collaborative research with societal relevance** provides capacity for rapid responsiveness to emerging priorities. This is exemplified by work described above on social inequalities, environmental sustainability and precision mental health care. Webster's appointment (from KCL's Health Protection Research Unit in Emergency Preparedness) developed our capacity here; she published influential and timely work on the COVID-19 pandemic (*Public Health*) including the psychological impact of quarantine (*Lancet*, >1,000 citations, Altmetrics >6,000). Similarly, the success of our COVID-19 Psychological Research Consortium (Bentall, Gibson-Miller and Levita) that delivered governmental reports on the impact of lockdown within weeks of its announcement, illustrates our capacity for rapid response, adoption of open science practices, and engagement with key stakeholders and the media (Figure 1). Other pandemic work has included studies of impacts on food intake (*Appetite*), vaccine resistance (*Nature Communications*), and mental health in the UK (*Psychosomatic Medicine*) and Poland (*Psychological Medicine*).



1.2 Impact strategy

Underlying our focus on societal relevance is a longstanding commitment to research for public benefit. This impact culture dates back to our MRC/ESRC Social and Applied Psychology Unit, which we hosted from 1968 until 1994. As detailed below, our impact strategy feeds this culture by working with key stakeholders through the research process to **co-design** projects, **co-produce** research outputs and **co-disseminate results** to ensure they reach key audiences to turn research into societal benefit. To achieve these aims we support staff to maximise interactions with key stakeholders such as policymakers, service providers and users (e.g., patient and public involvement panels, charities). Mechanisms of support include the University's knowledge exchange (KE) team which assists with identifying and liaising with non-academic collaborators as well as offering schemes to build impact partnerships (including funded impact sabbaticals; see sections 2 and 4). Our case studies illustrate the application of this approach to clinical service users in terms of assessing the outcomes of treatment (*Therapy Management*), developing brief interventions for eating disorders (*Eating Disorders*) and developing therapies to address the

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psychological impact of skin conditions (*Appearance Distress*). We apply this approach across all of our research themes.

Co-design: During project formulation, the departmental Director of Impact and University KE team support identification and involvement of key stakeholders to design research that addresses the issues that their organisations face during real-world practice. We invest to develop strong relationships, for instance by supporting impact-focussed sabbaticals. For example, Buckland works with Slimming World to evaluate and inform their weight management programmes, Matthews works with the National Deaf Children's Society to aid communication in hearing impaired babies and toddlers, and Saal works with SensArs, a commercial neuroprosthetics manufacturer to develop computational models of touch sensation. This approach successfully supported our case studies: Thompson identified the need for treatments focussing on the psychological aspects of skin conditions through advisory roles with skin charities including the International Vitiligo Foundation and Alopecia UK. Waller's positions on the NICE eating disorders committee and quality standards group enabled him to identify that policymakers needed brief interventions for eating disorders, inspiring his research.

Co-production: We develop stakeholder engagement during the research process to ensure we co-produce outputs that maximise relevance to their agendas. This includes consultation with steering groups representing non-academic stakeholders, practitioners and service users. For example, the *Eating Disorders* case study was supported by input from 75 service users when developing items for the Recovering Quality of Life measure (*Brit J Psychiatry*), ensuring its acceptability. Waller enhanced the impact of his brief eating disorders interventions by tailoring practical and financial aspects of therapy for widespread UK delivery through interactions with the IAPT programme leads, Public Health England, and the NHS.

Co-dissemination: Following research completion, we work with stakeholders to ensure dissemination reaches key audiences to enhance impact. This includes events aimed at non-academic audiences (e.g., Transport Research Laboratory, The Nuffield Foundation), keynote presentations at policy- and practitioner-orientated conferences (e.g., Royal Society for the Prevention of Accidents) and training for practitioners. The latter has been particularly relevant to our case studies; Thompson trained more than 300 NHS/IAPT Psychological Wellbeing Practitioners and provided over 30 training sessions to dermatology specialists on mitigating the psychological impact of skin conditions. Waller trained over 750 clinicians in more than 30 national (e.g., Maudsley Hospital) and 11 international (e.g., Harvard/Massachusetts General) settings to implement his brief CBT for eating disorders. Section 4 details further examples of dissemination to stakeholders and the public.

1.3 Open science and research integrity

We made important contributions to global efforts to broaden the adoption of open science practices and improve replicability. We contributed to research showing that different teams can reach different conclusions when analysing the same dataset, a finding with international impact (*Advances in Methods and Practices in Psychological Science*; >250 citations, *Altmetrics* >2,400). We also value the publication of null results, particularly where studies follow Open Science principles of pre-registration and data-sharing and are adequately powered. Our submitted outputs include demonstrations that working memory training does not generalise beyond the training task (*JEP General*), that ego-depletion is unreliable (*PLOS One*), and that online inhibition training does not reduce problem drinking (*JCCP*). Von Bastian leads the development and global distribution of free open-source experimental software (www.tatool-web.com) which supports replicability by sharing stimuli and materials. Stafford is the University Research Practice lead, representing us at

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the UK Reproducibility Network that promotes Open Science across disciplines; he co-founded the Sheffield Reproducibility Network which organises University-wide reproducibility events. As our Departmental Open Science lead, von Bastian co-ordinates information sharing including our online hub for open science materials, and provides guidance on adopting open science practices through seminars and training sessions.

Positive outcomes arising from our embrace of Open Science were demonstrated in a 2019 staff and PGR survey that highlighted widespread engagement with open science practices. For example, >50% of staff reported making data openly accessible, and 60% had preregistered hypotheses. This survey also captured demand for training such as open software (e.g. R) and Bayesian analyses to maximise the reliability of findings, with sessions scheduled for 2021. We also incorporated coverage of open science practices and contemporary research integrity issues into our undergraduate and postgraduate research training. Our policy (introduced January 2016) to make all journal papers available open access has meant that more than 70% of articles published since 2014 are openly accessible via green or gold routes (the majority of the remainder will become open access following embargo). We publish manuscripts on preprint archives particularly when rapid dissemination is important, as illustrated in our COVID-19 work.

The University supports a **culture of research integrity** providing resources on authorship and conflicts of interest as well as an open whistleblowing procedure (see REF5a). We enhance this with departmental seminars on topics such as responsible use of metrics. The Department has a Research Ethics Committee and has been represented on the University Research Governance sub-committee. We led development of University guidelines addressing ethical assessment of human interventional research, and making research data openly accessible. We also developed specific guidance on issues raised in our core research including deception, incentives, and collecting self-report and neuroimaging data from vulnerable populations. We implement University policies requiring all staff and PGR students to complete ethics training, and for PGR students to complete a data management plan in their first year. Maintaining strong integrity is a key foundation underpinning our aims to conduct impactful research that is transparent and replicable.

2. People

We invest in our staff to deliver our research strategy. Accordingly, **all Category A Eligible staff have been submitted. All hold permanent contracts** or will move to them following externally-funded fellowships. Our eight **clinical academics are located on-site and are well-integrated into our research culture** with collaboration common, as illustrated by our COVID-19 research consortium (see section 1).

2.1 Staffing and recruitment policy

Our recruitment policy is guided by our research strategy to develop capacity around focused themes whilst enhancing interdisciplinary collaboration. Sixteen appointments since 2014 have maintained and enhanced strengths within themes, with several straddling multiple themes to foster synergies. For example, Vaci's research straddles the Neuroscience and Cognition, and Learning and Development across the Lifespan themes, whereas Webster bridges the Interventions for Psychological Health, and Social and Behaviour Change themes. We also targeted staff with interdisciplinary backgrounds to support our objective to stimulate wider collaboration: Iyer's research addressing social mobility and integration of migrants created links

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across social sciences; other new appointments created links with community health, epidemiology (Sirois), public health and engineering (Field).

Our new appointments were selected for outstanding research potential so they could contribute to our strategic objective to realise the societal relevance of our research whilst maintaining the quality of fundamental science. Their potential has been demonstrated by their successes which include publishing in respected journals (e.g., *PNAS*, *Lancet Psychiatry*, *Journal of Neuroscience*, *JEP: General*), and winning substantial research funding (European Commission, ESRC, EPSRC, GCRF, Wellcome; total apportioned >£1.7M). They will contribute to our societal relevance agenda, for example Blakey's ESRC New Investigator Grant (commencing 2021) will deliver a blueprint for a novel theoretically informed intervention to narrow inequalities in cognitive development.

To develop a sustainable research structure, we focused on appointments at lecturer level (12 hires) and prioritised candidates with leadership potential. For example, Schmidt previously led a research group in Freiburg, and Delgadillo was appointed to provide leadership in clinical psychology. We supplemented this approach with **strategic senior appointments (two readers and two professors) and three internal professorial promotions to maintain leadership balance** in the shorter term following nine senior retirements. Of the senior appointments, Bentall provided immediate leadership across the Department as exemplified in our COVID-19 response, whereas Iyer, Sirois and Field demonstrated leadership potential by holding senior roles at previous institutions.

Independent research fellows form an important component of our staffing strategy. We hosted fellows supported by ESRC Future Leaders (£230k), the Royal Society (£281k), EPSRC (£54k), and the Wellcome Henry Dale (£1.2M) schemes, with an external researcher to commence in 2021 funded by an ESRC New Investigator Grant (£186k). Martin and Howarth benefited from Faculty policy to provide permanent contracts to substantial fellowship holders. We aim to grow research capacity and increase diversity by proactively targeting external applicants, ensuring inclusivity for candidates with protected characteristics, and pairing them with experienced mentors to support their fellowship applications.

2.2 Staff development, reward, and support for ECRs

Our ability to **attract and retain staff** is supported by Sheffield's Academic Career Pathways framework which provides **flexible promotion routes** through research, impact and knowledge exchange (see *REF5a*). Staff undertake an **annual performance review where they receive feedback, agree SMART objectives, and identify training needs**. A departmental workload allocation model ensures a minimum 20% protected time for research and scholarship, which is increased in line with funded investigator time and PGR supervision (2020 average = 36%).

Probationary staff have additional protected research time: 60%, 40% and 30% in years one, two and three respectively.

We provide wide-ranging **staff development** opportunities, tailored to experience, that enables staff to fulfil their potential, chiming with the three pillars of the *Concordat to Support the Career Development of Researchers*. Incoming staff receive a PhD scholarship and start-up funds to support preliminary research and conference attendance. Probationers have a departmental mentor, and staff are encouraged to utilise the University 'Think Ahead' mentoring scheme (see *REF5a*). We provide structured support for grant applications, including regular internal seminars on grant writing and funding mechanisms and a supportive internal review process. We encourage ECRs to take appropriate leadership roles to support professional development. For example, lecturers have taken leadership roles in Sheffield Robotics (Wilson), research group leadership

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(Wilson, Levita), research ethics (Schmidt, Gibson-Miller), and Delgadillo was appointed Research Director at an NHS Centre for Psychological Research. Our research committee membership includes a named ECR.

We support **postdoctoral researchers' career development** by providing the same University and departmental induction as academic staff alongside project-specific skills training (e.g. psychophysiological techniques). They then access a development programme to fit their career track, including the 'Think Ahead' mentoring scheme. We balance research, teaching and supervision experience and transferable skills in order to inculcate research independence. Our staff (Martin, Wilson) led University initiatives to champion the professional development of postdocs and ECRs.

All staff (including part-time) can apply for a **semester-long research sabbatical every four years**. Notable outcomes of 11 sabbaticals since 2014 include securing multiple UKRI awards (Webb), and refocussing research on a new topic (Freeth: rare developmental disorders, charity funded; output in *J Abnormal Psychology*). We support staff applications for fellowships that fund research leave, with two British Academy Mid-Career Fellowships awarded (Matthews and Milne). Von Bastian was awarded the Mercator Fellowship in 2020 by a consortium of 25 German universities for a programme of multitasking research, supporting several international visits including a three-month sabbatical at Aachen University.

As described in section 1, **we enable staff to maximise impact** by working closely with non-academic partners through project formulation, execution, and dissemination. Impact and knowledge exchange-focussed sabbaticals are important to this approach. Thompson spent a department-funded sabbatical developing psychological interventions for skin conditions, contributing to his impact case study. Other staff benefited from University-funded impact sabbaticals: Norman worked with the Haringey Advisory Group on Alcohol to increase engagement with their 'Don't Bottle It Up' online intervention. Rowse worked with Crohn's and Colitis UK to develop inflammatory bowel disease treatment guidelines. Additionally, flexible workload allocation allows staff time to develop impact. For example, Waller and Thompson had capacity to train clinicians to deliver the therapies they had devised. We also support staff to work flexibly with other organisations. Delgadillo has a 0.4 FTE NHS-funded role as Director of an NHS Centre for Psychological Research, providing a new route from research to public benefit.

The **effectiveness of our support mechanisms** is demonstrated by staff outcomes. Of the 16 staff who completed probation since 2014, all moved to open-ended contracts, and Saal and Delgadillo were promoted to Senior Lecturer. Successes for six ECRs identified in REF2014 include publications in prestigious journals including *Personality and Social Psychology Review*, *Biological Psychiatry*, and *PNAS*. Across all 36 Category A staff, there have been 14 promotions to senior lecturer or reader (three of whom were ECRs in REF2014), and three to professor (personal chairs), since 2014. The effectiveness of our staff development is also demonstrated by prestigious destinations for staff moving on, including Heads of Department (Durham and Edge Hill), professors of Psychology (University of North Carolina, Cardiff University) and independent research positions (Sheffield Hallam, Warsaw). Former postdocs hold permanent academic positions in the UK (including Manchester, Sheffield, and Warwick) and overseas (e.g., Maastricht). Other postdocs have been successful in non-academic positions, including CEO of Prolific, the online research participant recruitment company.

2.3 Research students

Maintaining a vibrant and productive PGR community is central to our research strategy.

We have one of the largest cohorts of research students in the Russell Group, with 72 PhD

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students and 51 Doctorate in Clinical Psychology (D Clin Psy) trainees currently registered. All Category A staff are either currently supervising PhD students, have supervised students to completion since 2014, or (in the case of some recent appointees) will soon recruit their first PhD students on University-funded studentships.

PGR recruitment is supported by external advertisements that integrate prospective candidates into our thematic priorities; they are then supported to apply to appropriate funding schemes. Commensurate with our strategy to promote interdisciplinary research and maximise societal relevance, we target competitions run by the ESRC White Rose Doctoral Training Partnership (DTP) (comprising seven universities including Sheffield, Leeds, and York) that promotes interdisciplinary work across the social sciences (13 studentships secured since 2014). In addition to other Doctoral Training Centres in Sheffield (BBSRC, MRC, EPSRC, Wellcome) we have secured studentship funding from sources including Horizon 2020, and the Battelle Memorial Institute. We also capitalised on University interdisciplinary initiatives, securing studentships from the Grantham Centre for Sustainable Futures, Healthy Lifespan Institute, and other cross-disciplinary studentship networks. Our strategic aim to focus on societal relevance has attracted studentship funding from non-academic partners including Road Safety GB, Sheffield City Council, and Alcohol Change UK.

We secured 14 studentships via internal University competitions and the faculty funded a further 20 teaching studentships. Another 13 PhD students were funded by the South-East European Research Centre via City College in Greece, an international faculty of the University. We have grown overseas student numbers (20% of new registrants in 2014 increasing to >60% in 2019 and 2020) supported by the governments of Mexico (11 studentships), Turkey (10), Saudi Arabia (4), Malaysia (3), and others. **Equality and diversity** is an important consideration for PGR recruitment: 13.5% of registrants were part-time and 34% identified as Black, Asian and minority ethnic (BAME, PRES, 2019). Our EDI Director sits on an ESRC working group to increase British BAME PGR representation.

Supervising staff complete PGR supervision training (mandatory from 2021). Our PhD students benefit from the University Doctoral Development Programme and give oral (Year 1 and 3) and poster presentations (Year 2) at student-led conferences. They complete an annual training needs analysis. Students are encouraged to identify appropriate internal (e.g., MSc modules) and external training courses (e.g., International Statistical Genetics Workshop, Colorado) that can be funded by the (minimum) £1,500 per annum research training support grant available to all, regardless of funding source.

Progress monitoring procedures are robust and supportive: formal supervision meetings are recorded online and monitored by PGR administrators who identify additional support requirements. Supervisors of full-time students complete an interim progress report after six months and students complete their formal confirmation review after 9-12 months (99% of registrants progressed to PhD; 1% re-registered for MPhil). In order to foster research independence, develop transferable skills and facilitate networking our PhD students attend our external and internal seminar programmes. The latter include ad-hoc training sessions in skills such as fellowship applications, peer review, and open science practices. The University has adopted UKRI sick leave policies for internally funded students, and also provides maternity grants for those without other income. We encourage a healthy approach to holiday leave, making entitlement clear to students and supervisors.

The **success of our approach and the vibrancy of the postgraduate training environment** is evidenced by the award of 113 PhDs (90% with minor or no corrections) and 123 D Clin Psy degrees during the assessment period. Excluding withdrawals (<5%), 94% of PhD students

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submitted their thesis within their time limit. Research students contributed substantially to our research output, co-authoring ~200 publications, including first-author publications in *Journal of Neuroscience*, *British Journal of Psychiatry*, *Clinical Psychology Review*, *Pediatrics*, and *Developmental Science*. Moreover, several PhD students published independently from their supervisors, including an influential paper on autonomous sensory meridian response in *PLOS One* (>70 citations), with others in *Multisensory Research* and *Journal of Sleep Research*. Our PGRs won prestigious prizes including the BPS Developmental Section's Neil O'Connor award, the International Society for Autism Research's Young Investigator Prize and the Association of Clinical Psychologists' prize for best clinical doctorate publication. In addition, they organised and delivered training for a national advanced quantitative methods network, and organised national conferences (ESRC DTP, PSYPAG). Several have written about their own and others' research for websites including the Conversation and PsychReg.

PhD graduates' career destinations include research (42%, including Harvard Medical School, UCLA, University of Sydney), tenured academic positions (37%, including Manchester and Sheffield, and overseas including Columbia, Italy, Kuwait, and Malaysia), healthcare (5%, including NIHR Children and Young People MedTech Co-operative), and other industries (15%, for example consultancy in medical technology). Most D Clin Psy graduates took clinical posts.

2.4 Equality, diversity, and inclusion (EDI)

Our staffing profile is 44% female, 6% BAME, and 3% have a declared disability. We retained our Bronze Athena SWAN award in 2017 and our departmental EDI Director is leading priority actions towards a Silver award in 2021. For example, **we proactively encourage female and BAME applicants for academic posts and external fellowships by working with HR to develop inclusive language for advertisements, and we proactively solicit applications from excellent staff with protected characteristics**. All selection and promotion panel members undertake unconscious bias training and chairs undertake specialised training on appropriate decision-making. Our Department Executive is 60% female and 10% BAME. The EDI Director sits on the department executive and on the research, REF, and PGR committees and on academic selection committees. An equality impact assessment is a standing agenda item for all departmental committees.

There were equal numbers of males and females in our 16 new appointments, and five of 11 sabbaticals were taken by female staff. Women hold leadership roles, including Milne as Head of Department, and Hardy as longstanding Director of the Clinical Psychology Unit. We encourage all staff to discuss pathways to promotion during their annual appraisal meetings so that we do not rely on individuals to put themselves forward. This has resulted in equivalent success rates for male and female promotion applications since 2014.

All staff benefit from protected research time and at least £500 annual research support funding for research visits, conferences, and research pump-priming. **The Academic Career Pathways framework includes proportionately reduced expectations for part-time staff and recognises career breaks including maternity and sickness leave. We support staff with caring responsibilities by holding core meetings and events between 10am-2pm and by supporting flexible working arrangements**. We encourage job-sharing of administrative roles in order to encourage applications from part-time staff (19% of staff); our departmental ethics committee is co-chaired by two staff, one of whom works part-time. Our staff access University support including Wellbeing Advocates and Mental Health First Aid to which several of our staff and PGRs actively contribute. We have introduced or contributed to University-wide campaigns to promote EDI. For instance, Milne introduced an initiative to tailor the environment for people who experience sensory

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overload, as part of a broader programme to increase inclusivity for neurodiverse staff and students.

University initiatives such as the **Women Academic Returner's Programme support staff returning from parental leave** with £10k research funding and 45% protected research time to facilitate restarting research activity. Seven Psychology staff benefited, enabling them to pay for research assistance to support grant applications.

EDI was prominent in the construction of our REF submission as specified by the University's Code of Practice. All REF Committee members undertook REF-specific EDI training which included recognising and countering implicit bias. Outputs were selected on the basis of ranked quality. There were 31 identically scored outputs from which 15 were required. Following review, the inclusion rate was 42% for papers attributed to female authors and 50% for papers attributed to males. The University's equality impact assessment found no bias in our output scoring and attribution or in our independent researcher decision-making.

The institutional process for disclosing equality-related circumstances was highlighted to staff. The University is clear that there will be no detriment to staff regarding classification as an independent researcher or output submission count in recruitment, review, or promotion.

3. Income, infrastructure and facilities

3.1 Income

Our total research income was £10.24M with key contributions from the research councils (41%), UK charities (30%), and the European Commission (14%). **ESRC is strategically important because their emphasis on societal relevance and their priorities for mental health and innovations in social and health care are closely aligned with our own strategy and thematic strengths.** Capitalising on departmental and University internal review processes specific to ESRC applications we have grown our ESRC awards from an average of £167k per year (2013-2018) to £753k per year (2019-2020). Seven recent ESRC awards, including two New Investigator Grants (total £2.22M) starting in 2019 or later will address (1) self-compassion in behaviour change, (2) political humour, (3) psychological impacts of the pandemic, (4) delineating the associations between multiple health behaviours, (5) social inequalities in school readiness, (6) cognitive training across the lifespan, and (7) distractor interference in autism. Therefore, **ESRC funding will underpin the future success of our research with societal relevance.**

Our strategy of **promoting interdisciplinary collaboration has been supported by substantial funding for large multi-disciplinary projects.** For example, we manage £340k from the James-McDonnell Foundation in collaboration with neurobiologists, and £285k from NIHR in collaborations with neurologists and health service researchers addressing diet (*Clinical Neurology*) and treatment (*European Respiratory Journal*) in motor neurone disease. A recent EPSRC award (£219k) partners with Toshiba to investigate how synthetic 'Argubots' can improve people's understanding of complex debates. Going forward, our participation in the University's flagship institutes and continued role in Sheffield Robotics will stimulate future collaborative interdisciplinary funding opportunities.

Other major grants have **supported our focus on high-quality fundamental science that underpins research with societal relevance.** Within neuroscience, UKRI funding has supported work addressing neurovascular coupling (MRC, £421k, *Cerebral Cortex*); other substantial neuroscience projects (>£2.15M) have been supported by health focussed charities including

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Wellcome (£1.2M), Alzheimer's Research UK, British Heart Foundation, and Epilepsy Research UK. Other charitable funding has supported work on social inequalities in social and cognitive development (two Nuffield awards, £243k, *Child Development*), developing behavioural interventions for inflammatory bowel disease (Crohn's and Colitis UK, £111k) and using typing errors to diagnose Parkinson's Disease (Michael J Fox Foundation, £61k, *Scientific Reports*). NIHR funding has provided important support for our clinical research, for example enhancing telephone-delivered therapy (£282k). Small charitable grants have supported high impact publications as exemplified by an £8k award from the Child Growth Foundation to investigate cognition in Silver-Russell Syndrome (*J Abnormal Psychology*). **Our focus on societal relevance means that charity funding will remain important to future funding strategy.**

The Global Challenges Research Fund (GCRF) supports our aim to **extend our research with societal relevance to the priorities of LMICs**. Initial successes include projects that use computer games to reduce gender-based violence in the Caribbean (£55k; *Computers in Human Behavior*), and a 2020 award (£33k) to use mealtimes to encourage language development in Zambia and Kenya. To develop future projects we capitalised on the University's Research England GCRF pump-prime funding to build networks in LMICs including China, The Gambia, Ghana, and Uganda. **Future strategy will develop our activity in this space**, leveraging these newly formed networks.

European funding remains important; Horizon 2020 is well suited to enhancing our interdisciplinary research. Awards have supported European collaboration for (1) our computational neuroscientists with computer scientists, systems engineers and roboticists in bioinspired robotics in the Human Brain Project (£739k) leading to several outputs (e.g. *J Neuroscience*); (2) in neural coding of touch for prosthetics and robotics (£249k) and (3) in the Dreams4Cars project (£369k). Dreams4Cars implements the general hypothesis of adaptive human action selection in software controlling autonomous vehicles, to guide driving in road situations of high crash risk (several publications in engineering journals). Finally, (4) a 2019 Marie-Curie Research and Innovation Staff Exchange consortium (€92k to Sheffield) supports staff exchanges with European partners to address bioinspired robot navigation, and will develop new international collaborations for future projects.

The funding landscape could change considerably following the pandemic and Brexit, however recent substantial awards from a range of funders will ensure our resilience in the medium-term. We have also positioned ourselves for rapid and flexible response to changing priorities and opportunities, as demonstrated by our reaction to the call for COVID-19 research (£260k ESRC). Therefore, we are well placed to leverage upcoming opportunities from diverse funding bodies to support our research strategy.

3.2 Infrastructure and facilities

Our research is supported by specialised state-of-the-art research facilities across four sites. As planned in REF2014, our computational neuroscientists moved into the £3M newly built Sheffield Robotics facility. This provides access to 200m² of robotics laboratory space, a 50m² workshop and a 20m² human-robot interaction lab. **Our physical location in Sheffield Robotics provides multidisciplinary collaborative opportunities** with computer scientists, roboticists, sociologists and education specialists and access to £2M of state-of-the-art robotics platforms. These include the iCub humanoid and several biomimetic social robots that underpin our embodied computational neuroscience modelling. Sheffield Robotics also houses a 60m² motion capture and virtual reality lab with a 12-camera VICON system that is co-directed by Wilson and Saal (funded by an EPSRC ECT Capital Enhancement Programme award) and also provides access to virtual

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and augmented reality systems (Virtualis, HTC VIVE, Oculus, and CyberGlove). These support our contribution to numerous activities including a recent AHRC 'Cyberselves' project that explores how self-identity may be redefined through technologies such as virtual and augmented reality. The University's high-performance computing facilities (see REF5a) enable our computationally intensive research including modelling of dopamine's role in basal ganglia function (*J Neuroscience* outputs).

Our **wet lab neuroscience** is situated within the University's main biology building, providing 206m² of laboratory space. Acquisition of **in vivo two photon microscopy imaging capacity**, combined with existing multimodal in-vivo imaging, electrophysiological, optogenetic and immunohistochemistry technologies and a 7T animal MRI imaging facility supports preclinical neuroscience studies spanning single cell imaging up to the neuroimaging of the whole brain; a capability available in few other labs around the world. Collaboration within the university provides access to further neuroscience facilities. For example, Howarth worked with colleagues in the Department of Infection, Immunity and Cardiovascular Disease to create a zebrafish model of neurovascular coupling, supported by a £353k NC3R award (outputs: *J Cerebral Blood Flow & Metabolism; Disease Models and Mechanisms*). Going forward, our involvement in the University's flagship Neuroscience Institute will provide access to leading technologies including a new human MRI/PET facility, funded by £2M University investment. This will strengthen links between pre-clinical and clinical research. For example, studies with receptor or metabolite specific neuroimaging in clinical cohorts will be operated in parallel with multimodal, multiscale (cell-to-whole-brain) preclinical studies within our neurovascular laboratories.

The main Psychology department moved to a newly acquired and fully refurbished building in 2016. This provides over 500m² of staff office space, a further 390m² for PGR students, and 122sm² of laboratory space including 18 experimental testing cubicles. We also retained >150m² of laboratory space at our original site, providing 10 further experimental laboratories. This **infrastructure provides flexible laboratory space to support our social, cognitive and clinical data collection.** It houses our human cognitive neuroscience research facilities including two Biosemi EEG systems which were upgraded following a £40k departmental investment. One system has a city centre location facilitating access to community samples. The other is close to green space and has designated parking, making it suitable for parents to bring children; it was designed for accessibility for neurodivergent populations with limited sensory distraction. Both EEG systems are housed within shielded Faraday cages in electrophysiology laboratory suites with capacity to record ECG, skin conductance, and electromyography independently or concurrently. We also invested in transcranial direct-current stimulation equipment and are developing capacity to combine this with EEG. Additionally, alumni and departmental funding supported upgrade of our portable EEG equipment (two ANTNeuro EEG systems). Collectively, these facilities have supported a range of outputs addressing neurological functioning in autism spectrum disorders (e.g., *J Abnormal Psychology, Autism Research*), and neurotypical functioning (e.g., *Neuroimage, Cortex*).

To support cognitive research, we house an Eyelink 1000 static eye-tracker and recently upgraded our SMI mobile eye-tracking system to Tobii-Pro glasses. Capitalising on our neurodivergent-friendly laboratory facilities this equipment has supported work on visual fixations in autism (e.g., *J Abnormal Psychology, Autism*) and ADHD (*J Eye Movement Research*) alongside collaborations with architects investigating engagement with the urban environment (*Sustainability*).

Going forward, we are developing our infrastructure and adding new space to support research growth and maintain state-of-the-art facilities. **Developing the wet neuroscience and main**

psychology space is pivotal to the University's ambitious 10-year plan for refreshing the Science faculty's estate.

4. Collaboration and contribution to the research base, economy and society

4.1 Research collaboration

Collaboration is central to delivering our research strategy in terms of accessing (1) interdisciplinary expertise; (2) resources such as specialised data and equipment; and (3) enhancing societal relevance. To achieve these aims we support staff to work with the most appropriate research groups in the world whether they are local, national or international, via the following **mechanisms**:

- Support for visiting academics: we hosted >30 international visitors from Europe, China, Israel, and the USA.
- Study leave for research visits: we have undertaken >80 overseas visits supported by external travel awards (e.g., GCRF, Worldwide Universities Network) or host organisations. Sheffield's International Faculty in Thessaloniki facilitated staff visits and collaborative research through PhD scholarships.
- Funded external speaker programmes.
- Financial support to attend conferences.
- Holding research away days with other Sheffield departments.
- Supporting applications to the White Rose Collaboration Fund for seed corn funding for joint Leeds, Sheffield, and York projects (4 awards).

The effectiveness of our approach is demonstrated by the following: All staff held external collaborations that led to publications. 90% of staff have at least one active international collaboration (>100 collaborative projects); and 41% of published outputs involved international co-authors, most commonly from the USA (174 outputs), Germany (70) and Australia (69), with others in China, Brazil, Uganda, and other countries. 16 staff held funded UK-based collaborative projects, supporting >150 outputs from national collaborations.

Evidence that collaboration achieves our strategic objectives is as follows:

1. **Interdisciplinarity:** External collaboration provides access to interdisciplinary and specialist expertise across the sciences, humanities, arts and medicine. For example, Wilson combines his computational modelling skills with experimental and behavioural genetics expertise at laboratories in University of California (UC) Davis and UC Riverside on his James S McDonnell Foundation project (*eLife* and *Scientific Reports* outputs). Supported by the US National Institute of Mental Health, Rowe participated in an interdisciplinary collaboration including psychiatry (McMaster) and behavioural genetics (Emory), providing access to international cohort data including the Georgia Twin Study (outputs in *Molecular Psychiatry*, *J Abnormal Psychology*). Matthews' work to develop interventions to promote child language development (funded by ESRC, British Academy and Nuffield) is enhanced by collaborations with computational linguists (Liverpool), who analyse large corpora of naturalistic speech, theoretical linguists (Leeds, York) and educationalists (UCL) who contribute understanding of real-world educational contexts (e.g., *J Child Psychology and Psychiatry*).

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2. **Access to specialised resources:** Our expertise adds value to, and benefits from, resources that external organisations have invested in. For example, Schmidt collaborates with UC San Diego to model their large human EEG datasets (*eLife*, *Nature Neuroscience*) and with UC San Francisco and Bordeaux to analyse the effects of optogenetic stimulation in animal models of Parkinson's disease (*Neuron*, *J Neuroscience*). Saal collaborates with UCL and Oxford to access 7T high-field human MRI scanning facilities (Wellcome funded) and Gothenburg who collect electrophysiological recordings from human nerves using microneurography (EU funded). Rowe investigates road lighting to reduce pedestrian accidents in collaboration with the Leeds Institute of Transport Studies who provide data from an advanced virtual reality driving simulator (EPSRC funded).
3. **Enhancing societal relevance:** External collaborators support our societal relevance agenda. Debowska's collaborators in Jamaica, India and Uganda provide opportunities to evaluate the impact of prosocial games on gender-based violence in LMICs (*Computers in Human Behaviour*). Field contributes to a £693k NIH-funded project that applies psychological theory to model the effects of policy interventions on population-level alcohol consumption, led from our Engineering faculty with external academic partners across the USA and Canada. Strong NHS collaborations maximise the societal relevance of our clinical research: in addition to Delgadillo's role as Director of an NHS Centre for Psychological Research (see Section 2), we are members of the Sheffield Mental Health Collaborative alongside Sheffield NHS trust, charities, and Sheffield City Council. Our Psychotherapy Evaluation and Research Lab (PEARLS; see section 1), brings together clinicians and psychotherapy service providers, and co-ordinates the Northern IAPT Practice Network. NHS collaborations support access to large psychological service evaluation datasets for Barkham, Kellett and Delgadillo. For example, Barkham compared the effectiveness of different treatment approaches using the 2nd UK National Audit of Psychological Therapies accessed via NHS Digital (*BMC Psychiatry*), and five years of regional IAPT evaluations accessed through collaboration with NHS Trusts (*BMC Trials*).

Collaborative arrangements for PGR training

Interdisciplinary collaboration for PhD supervision is supported by the ESRC White Rose DTP which provides training events across the seven participating universities centred around interdisciplinary themes including (a) Wellbeing, Health and Communities, (b) Education, Childhood and Youth and (c) Advanced Quantitative Methods. The DTP also supports cross-institution multidisciplinary co-supervision; for example we participate in a three studentship-network award addressing inequalities in cognitive development which involves supervision from Psychology, Health Sciences and Sociology departments across three universities. Cross-institutional supervision is also supported where external supervisors provide a unique disciplinary contribution, for example expertise in behaviour genetics from Goldsmiths. Societal relevance is embedded in PGR training through White Rose DTP schemes that require substantial collaboration with a non-academic partner. Our studentship awards include partnerships with Sheffield City Council, Bradford Institute of Health Research and Alcohol Change UK.

4.2 Interactions with research users and contribution to society

As described in our impact strategy (Section 1), we actively encourage staff to interact with research users to maximise societal relevance, and provide mechanisms to enable impact. Our engagement with NHS trusts positions us to generate public benefit from our clinical research. Beyond our impact case studies (see section 1), examples of clinical impact include developing a guided self-help version of Cognitive Analytic Therapy suitable for IAPT delivery (*Behavioural and*

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Cognitive Psychotherapy) and providing recommendations for delivery of telephone therapy during the COVID-19 lockdown (*Int J Eating Disorders*). During an impact sabbatical with Crohn's and Colitis UK, Rowse contributed to the European Society for Gastrointestinal Endoscopy Clinical Guideline for small-bowel capsule endoscopy (*Endoscopy*) and to benchmarking UK standards for inflammatory bowel disease treatments (*Frontline Gastroenterology*).

Our strategy of maximising societal relevance has also led to non-academic impact within our other research themes, as illustrated by the following examples.

- Buckland worked with national (Slimming World) and local (Zest community centre) organisations to develop and evaluate weight management programmes (*J Nutrition*).
- Webb partnered with Nestle Purina, generating >£200k research income to develop interventions to reduce pet obesity.
- Matthews' research on child language acquisition led to partnerships with Save the Children and the National Deaf Children's Society. She is lead scientific advisor for BBC Education's "Tiny Happy People", a five-year initiative to develop communication skills in 0-4-year-olds, and was recently awarded ~£200k to evaluate the programme.
- Freeth works with the Child Growth Foundation to investigate links between Silver-Russell syndrome and autism (*J Abnormal Psychology*).
- Wilson's recent EU-funded "iNavigate" project includes EODYNE systems neurorehabilitation technology manufacturer as an industry partner to optimise robotic spatial navigation.
- Stafford's EPSRC award (£219k, commenced 2020) partners with Toshiba to investigate how synthetic 'Argubots' can improve people's understanding of complex debates.

Public engagement

We support staff to engage with the media and directly with the public to disseminate their research and its broader implications. For example, researchers in our Learning and Development theme organise three public lectures per year on autism; these are well-attended and some have received >35k YouTube views. Ten staff appeared on broadcast media since 2014 discussing their findings or providing expert commentary on topics including inflammatory bowel disease (Rowse; Radio 4), Dry January (Field; Radio 4), Black Friday consumer behaviour (Webb; Sky News) and the COVID-19 Consortium study (Gibson-Miller, Levita and Bentall; BBC Online & Radio, Guardian, Sunday Telegraph, ITV News, Russia Today). Blakey and colleagues' ASMR research (*PLoS One*) was covered by more than 130 media outlets (Altmetric >1,200), and has >15k YouTube views. Print media features include Sirois' work on procrastination and self-compassion (New York Times, Daily Telegraph). Webster's psychological impact of quarantine paper (Altmetrics >6,000) was covered by 341 media outlets (e.g., Le Monde, CNN). We contribute to regional public engagement events including the biannual 'Sheffield Festival of the Mind', 'Pint of Science', 'Psychology in the Pub', 'Skeptics in the Pub', 'Discovery Night' and 'Discovery Morning' (10 staff contributed to one or more events). We have contributed to podcasts and written for specialist blogs and websites (e.g. Inside Government, Naked Scientist Podcast, The Conversation). Stafford received the 2014 BPS Public Engagement and Media award for his mindhacks.com neuroscience and psychology blog which received up to 100,000 unique visitors per day.

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4.3 Contribution to sustainability of the discipline

Our approach to open science and reproducibility (see Section 1) positions us to contribute to the sustainability of the discipline and beyond it. This commitment is illustrated by Webb's 2020 ESRC award (£441k) to create an evolving big data resource to synthesise correlations between diverse forms of behaviour. This project capitalises on a cross-theme collaboration combining expertise in health (Norman), clinical psychology (Huddy) and large-scale longitudinal datasets (Rowe), combined with interdisciplinary expertise in computer science, data analytics and human-computer interaction to develop an interactive database of behavioural correlations that can be organically updated by all researchers. The database will be openly accessible via a collaborative workbench allowing academics, policymakers and other stakeholders to generate pooled-estimates of the links between bespoke pairs of behaviours. The project will deliver new findings on the relationships between behaviours with impact on issues of societal relevance.

19 staff (>50%) held at least one editorial role, including 25 handling editor (associate or senior editor) roles in journals including *Psychological Bulletin*, *Journal of Experimental Social Psychology*, *Memory*, *Health Psychology Review*, and leading specialist journals (e.g. *Addiction*, *International Journal of Eating Disorders*). Rowe twice received "star reviewer" awards from *Journal of Child Psychology and Psychiatry*, and Publons recognised Rowe and Von Bastian as 'top peer reviewers'. Our staff were members of **national and international funding boards** including BBSRC Panel A, ESRC Panel A and Future Leaders panels, NIHR programme grants board, the Royal Society international schemes board, Leverhulme Prize panel and the British Academy Psychology Section. Four staff sat on international panels (Australia, Catalonia, Finland, and France), and two currently sit on the European Research Council Investigator awards panel. Our staff also sit on charity research grant panels including Alcohol Change UK, Autistica, and Crohn's and Colitis UK.

More than 80% of staff have reviewed grants including 16 staff who reviewed for overseas funders. Four staff contributed to the ESRC Peer Review College. Broader disciplinary contributions include Stafford who has a 0.2 FTE role as the University's Research Practice lead, an academic leadership role that is part of the UK Reproducibility Network. Our staff were **external examiners for more than 100 PhDs**, 40 of which were overseas including Australia (10), Canada, India, USA, and Europe, exemplifying our international reputation.

These contributions to the discipline have been **enabled by our workload allocation model**, which incentivizes editorial roles and funding body positions with workload adjustments, and allocates one week per annum (or part-time equivalent) for ad-hoc grant and journal peer-reviewing.

We contributed to **conference organisation** with staff serving on the committees of >10 international conferences, including EEE Haptics and Eurohaptics, Society for the Study of Ingestive Behavior, European Health Psychology Society, European Association for Social Psychology, and the Royal Society Theo Murphy meeting. Waller chairs the BABCP Scientific Committee (2013-2022) and Webb co-chairs the Society for the Study of Motivation program committee. We contributed to organising the inaugural (2019) UK Neural Computation conference and will host this conference in 2021; we also hosted the Procrastination Research Conference, Child Language Symposium, Greater Yorkshire Memory Meeting, and the Sheffield Glia symposium. We have given >30 **keynote/plenary lectures** including the BPS Social and Health Psychology sections, and three at BABCP. Freeth was the early career keynote speaker at the 2016 Neurodevelopmental Disorders annual seminar.

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Several staff have been **recognised for their research contributions**. Bentall was elected as a Fellow of the British Academy in 2014, Hardy won the 2016 BPS Shapiro award, and Barkham won the International Society for Psychotherapy Research's Senior Distinguished Research Career Award (2019).

In summary, this unit makes vital contributions to globally influential psychology and neuroscience research. This is demonstrated by the quality and volume of our research outputs and the arising impact, which has been supported by external funding from diverse sources. Our achievements reflect the outstanding research environment provided by the University of Sheffield that will allow us to continue addressing the most important societal challenges in the future.